

REMARKS

Claims 1-33 are pending in the application. Claims 1, 14, and 29 have been amended. Favorable reconsideration of the application, as amended, is respectfully requested.

I. ALLOWABLE SUBJECT MATTER

Applicants would like to acknowledge with appreciation the indicated allowability of claims 3, 4, 6, 8, 9, 12, 13, 16, 17, 19, 21, 22, 25, and 26 subject to being rewritten in independent form. Applicants believe that other pending claims are also in condition for allowance for the reasons set forth below.

II. REJECTIONS OF CLAIMS 1, 2, 5, 7, 10, 11, 14, 15, 18, 20, 23, 24 AND 27-33 UNDER 35 U.S.C. §§ 102 AND 103

Claims 1, 2, 14, and 15 stand rejected under 35 U.S.C. § 102(b) as being anticipated by “Akutsu” (U.S. Patent No. 5,701,041, first embodiment). Claims 1, 2, 5, 14, 15, and 18 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Akutsu (U.S. Patent No. 5,701,041, second embodiment). Claims 29-33 stand rejected under 35 U.S.C. § 102(b) as being anticipated by “Ono” (U.S. Patent No. 5,780,943). Claims 7, 10, 11, 20, 23, 24, 27, and 28 stand rejected under 35 U.S.C. § 103 as being unpatentable based on various combinations of references. Such rejections have in common the Akutsu patent. Claims 1, 14, and 29 have been amended to further clarify the features of the invention. All pending claims are believed to be allowable for at least the following reasons. Withdrawal of the rejections is respectfully requested.

The present inventions defined in independent claims 1, 14, and 29 are directed to a supporting apparatus. Specifically, independent claims 1, 14, and 29 have been amended to recite that “the first and second sections present negative stiffness in a lateral direction caused by magnetic force, thereby canceling at least a part of the positive stiffness of the supporting member.” Support for these amendments to the claims is found at, for example, page 8, lines 3-12, referring to Fig. 4, and Table 1.

The Akutsu patent relates to a weight supporting apparatus for XY stages for semiconductor fabrication. Throughout its application, the Akutsu patent describes how to compensate the weight of the tilt stage 1. Specifically, Akutsu’s goal is to move the tilt stage 1 from the base 6 “in the direction of gravity or inclining it” (column 2, lines 1-9). Nothing in Akutsu teaches or suggests “present[ing] negative stiffness in a lateral direction caused by magnetic force, thereby canceling at least a part of the positive stiffness of the supporting member” as recited in independent claims 1, 14, and 29.

In rejecting claims 1, 2, 14, and 15 based on the first embodiment of Akutsu, the Examiner asserts that the Akutsu system moves the tilt stage 1 in the Y direction (page 2, lines 20-21 of the Office Action). As described at column 3, lines 56-60, the Akutsu system generates the force only in the Z direction. In Akutsu, "inclining" or tilting the stage 1 is done by generating different forces at multiple weight supporting apparatus 5a and 5b. However, the different forces for tilting are in the Z direction, not in the Y direction (i.e., lateral direction as claimed).

Akutsu is concerned only with Z-directional displacement. See, for example, column 4, line 31 - column 5, line 23. Including this portion, the Akutsu patent is silent on lateral movement. If Akutsu were concerned with "negative stiffness in a lateral direction caused by magnetic force" as claimed, there would have been description regarding Y-directional displacement. However, Applicants were unable to find such description in the Akutsu patent.

Regarding the second embodiment of Akutsu, the Examiner cited column 5, lines 28-42 referring to Fig. 9 of the Akutsu patent. This portion merely shows a variation of a linear motor including the cylindrical coil 28, and the cylindrical permanent magnet 29. Again, the cited portion fails to teach or suggest generation of "negative stiffness in a lateral direction caused by magnetic force" as claimed.

The Akutsu describes a modified support which creates forces only along the Z direction, not along the Y direction. According to the Akutsu device, tilting of the stage is realized using different displacements along the Z direction. In short, the Akutsu patent teaches no deviation from the conventional weight supporting device which allows motions in the vertical direction (Z-direction), and restricts horizontal (Y-direction) motions. See, column 1, lines 12-21 of Akutsu. By contrast, the present invention is capable of presenting negative stiffness in a lateral direction by magnetic force, thereby canceling at least a part of the positive stiffness of the supporting member.

Regarding the Ono patent, similar to the teachings of the Akutsu patent, it teaches providing a force along the vertical direction. However, Ono fails to teach or suggest generation of negative stiffness in a lateral direction by magnetic force as claimed. The Examiner cited column 3, lines 36-56 of the Ono patent. This portion is concerned only with the vertical direction movement. Specifically, the cited portion mentions canceling two forces in the vertical direction when, for example, "the table is driven upward or downward" (column 3, lines 49-50). Again, nothing in the Ono patent suggests "negative stiffness in a lateral direction caused by magnetic force" as claimed.

For at least the reasons set forth above, independent claims 1, 14, and 29, and their dependent claims are believed to be patentable over the cited art. Withdrawal of the rejections is respectfully requested.

III. CONCLUSION

Applicants believe that all pending claims are in condition for allowance, and respectfully request a Notice of Allowance at an early date. If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 510-843-6200.

Respectfully submitted,
BEYER WEAVER & THOMAS, LLP

A handwritten signature in black ink, appearing to read 'Haruo Yawata', with a stylized flourish at the end.

Haruo Yawata
Limited Recognition under 37 CFR § 10.9(b)

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